A vessel health preservation framework has been launched in the UK to help health professionals select and manage vascular access devices and improve patient care.

### A framework for selection of vascular access devices

#### In this article...
- Why a vessel health framework is needed
- How to use the framework
- Benefits for patients

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#### Abstract

Many vascular access devices are inserted without undertaking a formal assessment of their suitability for patients and prescribed treatment. This can result in repeated attempts to cannulate patients with poor veins and failure of devices during treatment. A vessel health preservation framework has been developed to help support decision making when patients require vascular access and aims to ensure patients receive appropriate and timely care.

When patients need intravenous (IV) medication, it is crucial that the venous access device (VAD) used to deliver medication is selected, inserted and managed appropriately. Failure to do so can result in complications such as:
- Catheter migration;
- Infection;
- Thrombosis;
- Development of fibrin sheaths;
- Occlusion;
- Phlebitis;
- Embolism (Gabriel, 2013).

A range of VADs is available, including peripheral vascular cannulas (PVC), midlines, central venous catheters (CVC), and less commonly used devices such as total implanted venous access devices and dialysis lines.

While the need for long-term devices, such as dialysis lines is carefully considered by medical teams and discussed with patients, many short-term devices are routinely inserted in emergency departments. The assessment prior to insertion is often informal, poorly documented and carried out by junior members of staff (Jackson et al, 2013). Lack of a formal assessment may result in failure of cannulas due to poor vein quality or the administration of inappropriate drugs into the vein, while cannulas may be inserted but never used.

#### Developing a vessel health preservation framework

In 2011, a working group was set up to develop a vessel health preservation (VHP) framework for use in the UK. The group comprised anaesthetists, infection control and vascular access nurses, members of specialist vascular access groups and a representative from the Royal College of Nursing.

The VHP framework was completed in December 2014. Its copyright is jointly held by the Infection Prevention Society, National Infusion and Vascular Access Society, and the Royal College of Nursing. It aims to provide health professionals with an evidence-based framework to help decision making about VADs. It contains four tools:
- Vein assessment;
- Drug assessment;
- Right line decision;
- Re-evaluation of vascular access devices.

#### Vein assessment tool

Peripheral vein assessment is a crucial part of the framework as patients with poor veins often require multiple PVCs to complete a course of treatment (Oliver,
Table 1: Peripheral Vein Assessment Tool

<table>
<thead>
<tr>
<th>Grade</th>
<th>Vein quality</th>
<th>Definition of vein quality</th>
<th>Insertion management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excellent</td>
<td>4-5 palpable/visible veins suitable to cannulate</td>
<td>Cannula may be inserted by trained/authorised practitioners</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>2-3 palpable/visible veins suitable to cannulate</td>
<td>Cannula may be inserted by trained/authorised practitioners</td>
</tr>
<tr>
<td>3</td>
<td>Fair</td>
<td>1-2 palpable/visible veins suitable to cannulate. (Veins may be small, scarred or difficult to find and require heat packs to aid vasodilation)</td>
<td>Cannula may be inserted by trained/authorised practitioners but infrared viewer or ultrasound may be required to help locate the vein</td>
</tr>
<tr>
<td>4</td>
<td>Poor</td>
<td>Veins not palpated/visible (requires ultrasound assistance or infrared viewer)</td>
<td>Cannula may be inserted by practitioners experienced in cannulation (to be determined locally)</td>
</tr>
<tr>
<td>5</td>
<td>None</td>
<td>No visible (naked eye or aids) or palpable veins</td>
<td>Peripheral cannulation should not be performed</td>
</tr>
</tbody>
</table>

Note: The number of cannulation attempts permitted before escalation should be reflected in local policy.

Table 2: Example Drugs List

<table>
<thead>
<tr>
<th>Definitely central venous access</th>
<th>Consider central venous access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amiodarone (except emergency in cardiac arrest)</td>
<td>Vancomycin (especially when more than 2-3 days)</td>
</tr>
<tr>
<td>Some cancer chemotherapy drugs</td>
<td>Labetalol</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>Argiressin</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Caffeine</td>
</tr>
<tr>
<td>Epinephrine infusion (except bolus dose in cardiac arrest)</td>
<td>Glyceryl trinitrate (GTN)</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>Co-trimoxazole</td>
</tr>
<tr>
<td>Potassium &gt;40mmol/litre</td>
<td>Dantrolene</td>
</tr>
<tr>
<td>Total parenteral nutrition (unless only for first 1-2 days of therapy)</td>
<td>Phenoxybenzamine</td>
</tr>
<tr>
<td>Dopexamine</td>
<td>Foscarnet</td>
</tr>
<tr>
<td>Glucose &gt;15%</td>
<td>Nitroprusside</td>
</tr>
<tr>
<td>Nimodipine</td>
<td>Phenytoin</td>
</tr>
<tr>
<td>Sodium bicarbonate 4.2% or 8.4%</td>
<td>Ganciclovir</td>
</tr>
<tr>
<td>Sodium chloride 1.8% or above</td>
<td>Pentamidine</td>
</tr>
</tbody>
</table>

Drug assessment tool

Some drugs are not suitable for administration via a PVC as this can result in failure of the cannula and pain and discomfort for the patient, so drug assessment was an important part of the VHP framework. The group worked with pharmacists to review UK guidance on drugs that should be given via a central line; the most commonly used are listed in Table 2 (University College Hospital, 2014; Royal College of Nursing, 2010), but the list can be adapted for local use.

Right line decision tool

The right line decision tool brings together information from the vein and drug assessment to help health professionals assess the type of VAD that a patient requires (Fig 1, page 18).

The first step in the tool is to decide whether IV administration of drugs is required; it follows a step-by-step process of drug and vein assessment, after which the health professional is asked to consider the duration of IV therapy. The tool also requires the health professional to consider any factors that may be unique to the patient including:

- Patient preference, lifestyle issues, body image;
- Known abnormalities of the vascular anatomy that limit access to sites;
- Health of the patient and duration of therapy;
- Relevant past medical history, for example coagulopathy and poor cognitive function.

A device is recommended based on the outcome of these assessments. The tool uses dwell-time guidance based on evidence from the US Centers for Disease Control guidelines (O’Grady et al, 2011).
FIG 1. RIGHT LINE DECISION TOOL

GENUINE NEED FOR IV THERAPY?

YES

MUST therapy be administered centrally?
(See example drugs list)

NO

PERIPHERAL VEIN Assessment grade

CONTINUE via alternative route
Consider: Oral, sublingual, Inhaled, subcutaneous, nasal, transdermal, topical etc

PERIPHERAL VEIN ASSESSMENT

<table>
<thead>
<tr>
<th>1 EXCELLENT</th>
<th>2 GOOD</th>
<th>3 FAIR</th>
<th>4 POOR</th>
<th>5 NONE IDENTIFIABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient / Long Term</td>
<td>&lt;6 months Intermittent Therapy</td>
<td>&lt;4 months Intermittent Therapy</td>
<td>Ok for 4-6 wks Intermittent Therapy</td>
<td>One off Cannulation</td>
</tr>
<tr>
<td>Inpatient / Acute</td>
<td>Less than 10 days therapy</td>
<td></td>
<td></td>
<td>One off Cannulation</td>
</tr>
</tbody>
</table>

If Peripheral Vein grade not compatible with intended treatment duration, consider other type of vascular device

DURATION OF ANTICIPATED THERAPY?

<10 days
Non-tunnelled CVC / PICC or Midline

>10 days <4 weeks
PICC / Midline

>4 weeks - <6 months
PICC / Tunnelled CVC or TIVAD

>4 months - <6 years
Tunneled CVC/TIVAD

1 Epic 3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in Hospitals in England
2 Midlines are not a suitable option for drugs that must be given centrally
and Epic 3 infection prevention guidance (Loveday et al, 2014).

**Re-evaluation tool**

Re-evaluation of VADs is a crucial part of the VHP framework; the re-evaluation tool (Fig 2) guides staff to check the device is required and asks them to consider the patient’s condition and any new information that may have emerged. If the patient’s situation has changed, the tool prompts staff to use the framework to re-evaluate whether the right VAD is in place.

**Evaluation of the tool**

To date, the VHP framework is being piloted in a haematology ward at Aintree University Hospital, with both nurses and doctors providing evaluations on how it has informed their practice. Further evaluation is underway in cardiology wards at Aintree University Hospital Foundation Trust and St Helens and Knowsley Teaching Hospitals Trust. Early feedback has shown that the tool has empowered nurses and doctors to assess and recognise which device is needed for their patients in a more timely manner.

**Conclusion**

The VHP framework is designed to help health professionals make decisions about which VAD is appropriate for individual patients. It allows them to conduct vein and drug assessments and constantly re-evaluate the decision around the VAD as their patients’ condition changes. This feedback helps to ensure patients receive the best care possible.

The poster summarising the VHP framework is available for download at: Bit.ly/IPSVesselPoster. NT

**References**


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**FIG 2. RE-EVALUATION OF ACCESS DEVICE**

Daily assessment is required to ensure the device is appropriate, preserving vessel health and comfort for the patient. The assessment should consider any complications and whether the device is still required. In addition, observation of the vascular access device insertion site should be performed each shift.

- **Does the patient still need IV therapy?**
  - **Yes**
  - **No**
  - **NO TO ALL**

- **Does the current Vascular Access Device (VAD) still provide the optimum solution to the patient’s needs?**
  - **Evaluate the following:**
  - **Insertion site score > 0?**
    - **YES**
    - **NO**
  - **Device infected?**
    - **Suspected?**
      - **YES**
      - **NO**
    - **Proven?**
      - **YES**
      - **NO**
  - **Occlusion? (including persistent)**
    - **YES**
    - **NO**
  - **Thrombosis**
    - **YES**
    - **NO**
  - **Leakage?**
    - **YES**
    - **NO**
  - **Missed/delayed doses (due to device failure)**
    - **YES**
    - **NO**
  - **Dislodgement**
    - **YES**
    - **NO**

- **Reapply VHP Right Line Decision Tool to re-evaluate current need for VAD incorporating patient views**
  - **Yes**
  - **No**

- **Has any new clinical information evolved which might affect the choice of right line for this patient?**
  - **Yes**
  - **No**

- **Is a suspected diagnosis confirmed?**
  - **Has their condition changed?**
  - **YES**
  - **NO**

- **Continue to use current VAD according to local policy.**
  - **Continue surveillance for complications and continue to re-evaluate the on-going need for this VAD regularly.**

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*Use local vessel infusion phlebitis score*